JISC e-Learning Models Desk Study

Stage 2: Mapping Theory to Practice and Practice to Tool functionality based on the Practitioners' perspective

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1. Introduction

The study always planned to take a practitioner perspective and then explore the relationship between that perspective and existing theories (pedagogical , e-learning models etc), and existing resources (tools, technologies etc). The purpose of such mappings is to create theoretically grounded e-learning solutions as illustrated through a series of case studies.

One consequence of the approach is that some aspects of current practice will be deemed to be ineffective or sub-optimal. For practitioners to share this realisation will involve an element of 'rediscovering' pedagogy by making some theoretical considerations, inherent in tool selection, more transparent. What must be stressed is the emphasis is on the practitioner and not necessarily on current practice, some of which may not be considered to be effective.

A further consequence is that not all theories or learning models will be addressed (but see Stage 2 Learning Models (Version 1) for a review of the key ones). By taking a practitioner's perspective some of the theoretical distinctions are rendered less critical because their impact on practice is not significant, although in terms of explaining that practice there may be important distinctions. Hence practitioners should benefit by having a view of theoretical considerations which have implications for the improvement of their practice.

Equally, it is not possible to consider every tool or VLE (but see Stage 3 Tools and Technologies for further discussion). We believe that a practitioner will find it more useful to understand the requirements against which they can find the best match in the current e-learning tools/technology portfolio. The practitioner therefore becomes a 'critical consumer' – better understanding their own requirements informs their choice of tools.

The mapping document begins by trying to identify a pivotal concept that is understood by practitioners and from which theory and tool selection can be drawn out (section **2**). The theoretical and functional mappings are then described (section **3** and **4** respectively)

followed by the Mapping Table (section **5**). To help understand the table a set of general descriptions of each row is provided and some are accompanied by mini-scenarios illustrating practice in HE or FE (see section **6**). Section **7** addresses the issues of moving from generic functionality to choice of specific tools through the use of case studies. The case studies were also used to validate the Mapping Table, and the results are discussed in this section. Finally, some conclusions are drawn and recommendations made (section **8**).

2. Finding the starting point

The mapping activity is practitioner-centric, and so it was necessary to start with having some idea of what constitutes effective practice in term of actions and activities actually performed by practitioners. Stage 1 of the desk study was designed with this in mind. In contrast, Stage 2 focused on effective practice derived from theory rather than performance. However, a full analysis of practice based on already empirically collected data (ie Case Studies) was outside of the scope of this project. Instead, Stage 1 relied on other people's reviews and these are thin on the ground. The most promising appeared to be Pratt's classification (see Stage 1 Pratt's Classification Framework (Version 1)) but this was based on US custom and practice, and used a nomenclature which did not bridge well with the learning theories. Pratt's descriptors were also felt to be at the wrong level of granularity. Terms like 'transmission' provide a good overall description of the implied pedagogy[1] but not at the level of detailed performance. Such detail seemed more available in the standards literature particularly when the focus was on 'learning activities' (see Stage 3 Standards (Version 1)).

Consequently, the middle out approach adopted (ie from practice to theory, and practice to tool functionality) required a particular description of practice that was relevant at a given level of granularity (ie courses, units, lessons, or learning 'chunks'). Intuitively it was felt that a 'learning activity' at a lesson plan level of granularity would suffice, and this was checked and confirmed with the JISC expert group of practitioners. Learning activity was chosen partly for theoretical reasons (see Stage 2 Learning Models (Version 1) for a fuller discussion), and partly because, prima facia, it appeared to be a concept being addressed in current standards formation (see Stage 3 Standards (Version 1) for a fuller discussion of this issue). Indeed the standard's approach proved valuable in providing a vocabulary and definition for describing learning activity (see particularly the CANDLE project).

A learning activity was defined as:

> *The totality of the purposeful or goal orientated learning behaviour being analysed. These are grounded by the 'goals' of the practitioner and not necessarily driven by any specific theoretical consideration.*

[1] Indeed the earlier versions of the mapping table, including the one validated by the Case Studies project used Pratt's categories as the entries in the 'implied pedagogy' column.

The reference to theoretical consideration is important as our choice of learning activity does not imply any particularly theoretical bent (eg Vygotsky[2] or Engestrom et al[3]). It also must be noted that by taking a practitioner's perspective, the teacher is the central actor. Learning and learners are understood in the context of the teacher's or practitioner's role.

What are these generic learning activities? This is difficult question and again any selection had to be very aware of the granularity issue of addressing an activity expected in a learning session (eg a particular 'goal' for a particular lesson plan). In reviewing the literature, we felt that Bloom's taxonomy[4] provided a reasonable fit.

The table below is adapted from Bloom's categories and Conole et al's[5] mini learning activities were used to expand what we mean by 'generic'.

Generic Learning Activity	**Specific learning Activity**
Expose to new concepts, theories and facts	Receiving Information; scoping domains; identify boundaries; generalize from given facts;
Gather Facts/concepts	Gather resources; brainstorming a concept; discover facts; interpret facts; classify facts;
Evaluate Facts/concepts	Develop values; Synthesis of key findings from a range of resources; Ranking and rating a set of values; make judgments; make comparisons; interpret facts; recognize subjectivity
Reflect critically	Self assessment of level of competence; critique own performance; recognize own limitations;
Build/test theories/concepts	Recognise patterns; draw conclusions; predict outcomes; construct models; follow instructions; apply knowledge; demonstrate outcomes; plan experiments; state rules;
Solve Problems	Investigating a problem; analyze wholes into parts; synthesize parts into wholes; apply principles; select effective solutions; use methods, concepts, theories in new situations
Acquire Skills	Sequence parts; practice sequences
Acquire and apply knowledge to perform in real world settings	Observing, analysing and reflecting upon other people's real world behaviours, and then practicing those behaviours in real world settings
Engage in discussion	Defend a position; Setting up teams of learners; establishment of different roles in a team; Discussion; Sharing ideas and coming up with a combined list

[2] Vygotsky, L.S (1978) Mind in Society: The development of higher psychological processes. Harvard University Press, Harvard

[3] Engestrom, Y., Miettinen, R., Punamaki, R-L, and Punamaki-Gitai, R-L, (1999). Perspectives on Activity Theory. CUP, Cambridge.

[4] Bloom, B.S. (ed) (1956). Taxonomy of Educational Objectives: The Classification of Educational Goals. Longman: New York.

[5] Conole G., Dyke, M., Oliver. M., & Seale. J. (in press). Mapping pedagogy and tools for effective learning design. Computers & Education.

Present *(or explain)* facts	Organise material; create meaningful/logical sequences; determine appropriate level of complexity (material to match audience); practice delivery, explain *(or present?)* facts/concepts

Based on our definition, we then identified the following key characteristics of a learning activity:

1. **Roles** (locus of control for intended learning outcomes, task, feedback)
2. **Context** (type of task, type of group, relationship)

Role is about 'locus of control', whether it resides fundamentally with the teacher or with the learner. In the learning activity context it is contextualised by three subsets of activities.

- Who 'directs' the learning?. In teacher directed situations the learning outcomes and assessment methods are 'defined' by the teacher, whereas in learner directed, the learner 'agrees' or negotiates them with the teacher.
- Who chooses the tasks? Here the emphasis is more on 'how' the learning outcomes will be achieved (choice of tasks, resources etc), and who (the learner or teacher) is instrumental in making that decision.
- Who provides feedback?. Feedback involves the process of analysis and communication. It can be formative (occurring during the learning exercise) or summative (occurring after the main learning exercise has taken place). Again, the feedback process can be undertaken either by a learner or the teacher. The case of 'learner feedback' is similar to, but more narrow than, the concept of 'teach back'.

The **context** of the teaching and learning is also divided into three sub parts. These parts were seen as particularly relevant to determining the practitioner's requirements for the e-learning tools and technologies.

- The first part is concerned with the '**relationship'** between the teacher and learner, and learner and learners. It is based on Paulsen (1995)[6] categories of one-alone; one-to-one; one-to-many and many-to-many. However, because of the emphasis on the teacher's role, the one-alone category was not used. Learners will be expected to undertake singleton activities (eg searching online database) but in our context such activities are either agreed or defined by the teacher, and thus assume a one (teacher)-to-one (learner) or a one-to-many relationship. Equally 'self-taught' categories of one-alone are excluded as essentially no formal relationship exists with a teacher.
- The second sub set refers to the setting with respect to whether it involves an **individual or group activity**. This is related but

[6]Paulsen, M (1995). Teaching methods and techniques for computer-mediated communication. Online report. http://www.nettskolen.com/forskning/22/icdepenn.htm

independent from relationship structures. For example, it is possible for a teacher to provide one-to-one feedback for essentially a group activity (visiting each learner in sequence). Equally, it is possible to have a one-to-many relationship for an individual activity. This may involve, for example, sharing an individual's feedback with the whole group.

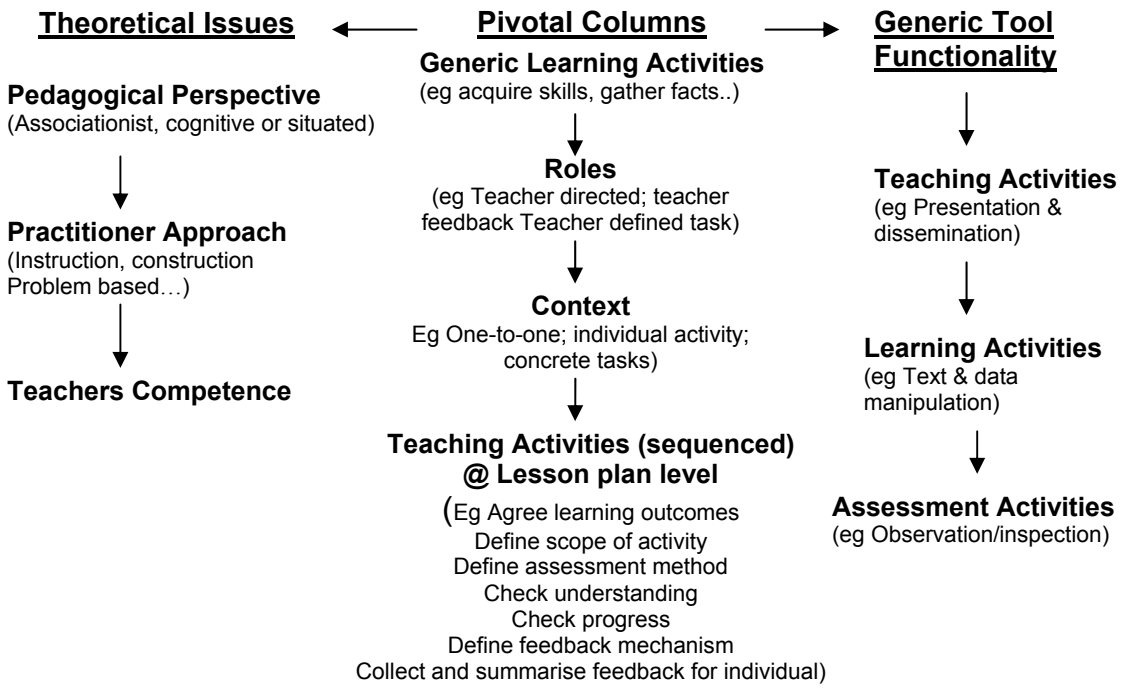
- Third, context also includes the **nature of the task**. Of particular importance is the question of task authenticity: whether the task is an abstract, concrete or 'real world' one. Generally the nature of the task can be reasonable expected to correspond to the learning setting (eg abstract tasks for abstract settings). Classrooms, for example, tend to be abstract settings because they purposively remove the learner from the application of the learning . In concrete settings the learners are placed in situations where they can demonstrate or manipulate (ie active or 'doing') but what they do (eg an experiment) may be have little real world relevance. Authentic settings are typified by work place learning (eg nursing) and are usually highly observational and reflective in nature.

The generic learning activity understood in context will suggest particular sets of teaching activities or operations (eg define learning outcomes). These define what the teacher should do, and are sequenced.

The relationship between these contextual activities in terms of the 'actions' (verbs) that should be used or found in the teaching activities, are illustrated in the table below.

Learner Directed (control/ownership)				**Teacher Directed**			
Agree/Support				*Define/Instruct*			
Learner feedback (progress)		**Teacher Feedback**		**Learner feedback**		**Teacher Feedback**	
Observe & evaluate		*Observe & assess*		*Question & evaluate*		*Question & assess*	
Learner Defined Task (how)	**Teacher Defined Task (how)**	**Learner Defined Task**	**Teacher Defined Task**	**Learner Defined Task**	**Teacher Defined Task**	**Learner Defined Task**	**Teacher Defined Task**
Monitor	*Construct*	*Monitor*	*Construct*	*Inspect*	*Explain*	*Inspect*	*Explain*

Generic Learning Activities, Roles, Context and Teaching Activities, form the 'pivotal' columns and represent the 'practice' component of the mapping table. From these columns, key theoretical issues and generic tool functionality were derived (see table below). Both of these are dealt with in more detail in subsequent sections of this report.



3. From Practice to Theory

How the context mediates between the learning and teaching activities can be defined by certain rules or legitimate combinations. The legitimacy is determined by theoretical considerations. For example, one simple 'rule' is that all examples from the cognitive perspective will, by definition, be learner directed. The learner being in control is a central tenet of constructivist pedagogy derived from the cognitive perspective.

The mappings are reflecting a set of behaviours deemed to be indicative of effective practice. Of course, other practices could still exist, and indeed often do exist, but would not necessarily be considered effective. For example, the instruction component of co-instruction in the cognitive perspective should not be confused with Pratt's transmission perspective. In the table, defining (co-)instruction as learner directed in abstract tasks distinguishes it from a crude 'delivery' view of instruction.

We do recognise that some of the recommendations are open to debate, and indeed we encourage such debate. The mapping table recommends effective e-learning solutions, and those recommendations must themselves be tested or externally validated by actual practice – what works or doesn't work in the context of real learning environments. Practitioners' experiences, described in case studies, will test, refine or reject some of the mapping table's recommendations.

Perspectives	Implied Pedagogies	Desirable Role Combinations	Learning tasks	Relationship	Generic Learning Activities (mapping row)
Associationist	Instruction (teacher-centric; learner active (by doing); emphasis on behavioural change not knowledge acquisition)	Teacher directed Teacher feedback Teacher defined task	Concrete tasks	One-to-one One-to-many Individual activity	Acquire Skills (1)
Cognitive	Co-Instruction (teacher as a instructor; emphasis on orienting learners, and the introduction of new concepts; learners have a relatively passive role)	Learner directed Teacher feedback Teacher defined task	Abstract tasks	One-to-one One-to-many Individual activity	Expose to new concepts, theories and facts (2)
	Co-instruction (learner as instructor through individual feedback process or execution of the task)	Learner directed Learner feedback Teacher defined tasks	Concrete (eg experiments) or abstract tasks (eg theory)	One-to-many One-to-one Individual activity	Gather facts/concepts (3)
	Co-Instruction (teaching shared between the mentor and the tutor).	Learner directed Teacher feedback Teacher defined task	Concrete tasks	One-to-one Individual activity	Build/test theories/concepts (4)
	Construction (learner-centric; learner constructs knowledge through active participation; discovery; testing etc)	Learner directed Teacher feedback Learner defined tasks	Concrete tasks	One-to-one One-to-many Individual activity	Gather facts/concepts (5)
	Construction (learner centric with teachers defining tasks to encourage active participation)	Learner directed Teacher feedback Teacher defined task	Abstract or concrete tasks	One-to-one Individual activity	Reflect Critically (6)
	Construction	Learner directed Teacher feedback Teacher defined task	Concrete Tasks	One-to-many Group activity	Evaluate facts and concepts (7) Build/test theories/concepts (8)
	Construction	Learner directed Teacher feedback Teacher defined task	Abstract tasks	One-to-many Individual activity	Present or explain facts or concepts (9)
	Construction (learner centric with teachers encouraging active participation in learner defined tasks, and providing appropriate feedback)	Learner directed Teacher feedback Learner defined task	Abstract or concrete tasks	One-to-many Group activity	Engage in discussion (10)
	Social Construction (learners working in groups but relying on social processes to support and benefit individual activities)	Learner directed Learner feedback Teacher defined tasks	Concrete tasks	Many-to-many Individual Activity	Build/test theories (11)
	Social Construction (learners working in groups but relying on social processes to support and benefit the group)	Learner directed Learner feedback Teacher defined tasks	Concrete tasks	Many-to-many Group activity	Engage in discussion (12)
	Problem based (learner centric; collaborative; emphasis on use of prior knowledge; very applied/concrete; emphasis on transfer of knowledge)	Learner directed Teacher feedback Teacher defined tasks	Concrete tasks	Many-to-many Group activity	Problem solving (13)
Situated	Situated Learning (knowledge is contextually situated; learning from real world setting; including the social context (communities of practice etc).	Learner directed Learner feedback Learner defined tasks	Real world tasks	Many-to-many Group Activity	Gather facts/concepts (14) Engage in discussion (15)
	Apprenticeship (teacher as coach (expert); context vital; social process critical;)	Teacher directed Teacher feedback Teacher defined tasks	Real world tasks	One-to-one Individual Activity	Acquiring and applying knowledge to perform in real world settings (16)

4. From Practice to Tool functionality

It was decided that it was not feasible to directly map to specific tools. The tasks of identifying, classifying and maintaining a database of such tools was beyond the scope of the project. However, some analysis of tools was undertaken to derive 'functional requirements' (see Stage 3 Tools and Technologies (Version 1)). Such requirements are seen to be more stable, and allow more flexibility in selecting a tool that best fits those requirements, as well suiting the individual practitioner's and their organization's needs. Three sets of functionality were identified: for teaching; for learning; and for assessment. The functional descriptors were adopted and adapted from the work of Conole[7]. The table below maps these functional requirements to the three main activities (teaching, learning and assessment).

Functional Requirements for Tools		
Teaching Activities	**Learning Activities**	**Assessment Activities**
Text & Data manipulation Presentation & Dissemination Data Analysis Information Seeking Storing & Managing Info Personal Management Communication (async and sync) Visualisation & Brainstorming Support & Guidance Simulations	As per teaching activities (Not all teaching activities cover learning activities)	Quizzes Self test Tracking Surveys Assignments Archives

[7] Conole, G. (2004). Report on the effectiveness of tools for e-learning. JISC.

5. Mapping Table

Pedagogic Perspective & Approach	Practitioner Approach implied by the pedagogy	Teacher Competence	Generic Learning Activities	Roles	Context	Operations (Teaching - sequenced)	Functionality Requirement for Tools		
							Teaching Activities	Learning Activities	Assessment Activities
Associationist perspective (Learning as acquiring behaviour through defining sequences of component to composite skills) 1.	1. Instruction	*Teacher expert in:* sequencing routines of organised activity with frequent feedback	Acquire skills	Teacher directed Teacher feedback Teacher defined task	One-to-one or One-to-many Individual or group activity; Concrete tasks	1.Define learning outcomes; 2. Position or orientate learner; 3. Create practice schedule 4. Define success criteria 5. Break down skills into component parts 6. Practice parts 7. Provide feedback 8. Practice parts until performance meets success criteria 9. Move onto next component and repeats steps 4-6. 10. Practice whole 11. Take any remedial action (i.e. repeat component part steps 4-6) 12. Repeat 'whole' until success criteria is met.	1,2,4. Presentation and Dissemination 3,5. Text and Data Manipulation 6,8,9,10,11,12. Text and Data Manipulation, Simulation 7. Communication (asych or sych)	Text and Data Manipulation, Simulation	Observation/ inspection

Pedagogic Perspective & Approach	Practitioner Approach implied by the pedagogy	Teacher Competence	Generic Learning Activities	Roles	Context	Operations (Teaching - sequenced)	Functionality Requirement for Tools		
							Teaching Activities	Learning Activities	Assessment Activities
Cognitive perspective Learning as achieving understanding (change of underlying cognitive structure - *NB process of change may be seen as predominantly individual or as socially mediated)* 2.	Co- Instruction *(Teacher works with the student to define the boundaries of their knowledge and understanding as a basis for introducing or orientating the learner to new concepts or facts).*	*Teacher an expert in:* collating, organizing and presenting knowledge	Expose to new concepts, theories and facts (receive, gather, select, analyse, summarise, evaluate, represent: read, write, draw etc)	Learner directed Teacher feedback Teacher defined task	One-to-one or One-to-many Individual or group activity; Abstract tasks	A. Preparation: 1.Define learning outcomes; 2. Position or orientate learner; 3. Identify appropriate content; 4.Define assessment method; 5. Decide presentation method 6. Prepare content (e.g. slides, notes, handouts); B. Execution: 7.gain attention; 8.deliver content; 9.reinforce outcomes; C.Evaluation 10. assess outputs against learning outcomes; 11. provide feedback; to individual or group 12 summarise feedback for individual/group.	1,2,4,9,12. Presentation and Dissemination 3. Information Seeking 5. Support & Guidance 6. Text and Data Manipulation 8. Presentation and Dissemination , Communication (Synchronous) 10. Evaluation and Assessment, 11.Communication 12. Data Analysis, Communication	The learner is passive apart from listening, reading and questioning so communication tools could be required.	Summary – multiple choice; essays; presentations.

Pedagogic Perspective & Approach	Practitioner Approach implied by the pedagogy	Teacher Competence	Generic Learning Activities	Roles	Context	Operations (Teaching - sequenced)	Functionality Requirement for Tools		
							Teaching Activities	Learning Activities	Assessment Activities
3.	Teach-back *(learner as instructor through feedback process)*	*Teacher expert in:* Directing students' to appropriate resources; organizing and moderating groups.	Gather Facts/concepts	Learner directed Learner feedback Teacher defined tasks	One-to-one or One-to-many Individual activity Abstract or concrete tasks	1.Define learning outcomes; 2. Define scope of activity or task (what, how much, how long etc); 3. Identify key references/resources; 4. Explain feedback process; 5. Agree evaluation criteria; 6. Agree Assessment Method 7. Check understanding of requirements; 8. Check progress 9. Monitor learner feedback 10. .Assess outputs against learning outcomes; 11. Collect and summarise feedback for individual.	1,2,3. Presentation and Dissemination 2. .Personal Management 3. Information seeking 4. Presentation and Dissemination, Communication 5,6. Communication (Synchronous) 7. Evaluation and Assessment, Communication 8,9,10 Evaluation and Assessment, Communication 11. Data Analysis, Communication	Visualisation and Brainstorming Storing & Managing Information	Summative assessment – presentations. Formative assessment – progress against outcomes (records kept)

Pedagogic Perspective & Approach	Practitioner Approach implied by the pedagogy	Teacher Competence	Generic Learning Activities	Roles	Context	Operations (Teaching - sequenced)	Functionality Requirement for Tools		
							Teaching Activities	Learning Activities	Assessment Activities
4	Co-instruction	*Teacher expert in:* Planning, mentoring, collaborating with mentor and learner ;drawing lessons from practice, applying theory to workplace	Build/test theories/concepts (generate hypothesis/question; select methods; devise experiment; choose resources; test theory; analyse results; revise test; retest; reflect; draw conclusions)	Learner Directed Teacher Feedback Teacher Defined Tasks	One-to-one Individual activity Concrete tasks	1. Agree learning outcomes 2. Define appropriate tasks 3. Explain feedback process and schedule 4. Define Evaluation criteria 5. Agree actions 1-4 with mentor 6. Capture performance 7. Assess, with mentor, outputs against learning outcomes 8. Agree feedback with mentor 9. Provide feedback 10. Review outcomes and schedule with learner and mentor	1,5, 8, 10 Communication (Synchronous) 3, 4, 8, 9 Communication (asychron) 3. Personal Management, 2, Presentation and Dissemination 5,6. Evaluation and Assessment,	Personal Management	Formative – diaries, notebooks etc Summative – evidences based portfolios.
5	Construction	*Teacher expert in:* Directing students' to appropriate resources; defining appropriate tasks and individual feedback..	Gather Facts/concepts	Learner directed Teacher feedback Learner defined tasks	One-to-one or One-to-many Individual Activity Concrete/ abstract tasks	1. Agree learning outcomes; 2. Agree scope of activity or task (what, how much, how long etc); 3. Define evaluation criteria; 4. Define Assessment Method 5. Check understanding of requirements; 6. Check progress 7. Assess outputs against learning outcomes; 8. Provide feedback; 9. Collect and summarise feedback for individual;.	1, 2 Communication (Synchronous) 2. Personal Management 2,3,4. Presentation and Dissemination 5,6. Evaluation and Assessment, Communication 7. Evaluation and Assessment 8. Communication 9. Data Analysis, Communication	Visualisation and Brainstorming	Formative assessment – progress against outcomes (records kept) Summative assessment – presentations.

Pedagogic Perspective & Approach	Practitioner Approach implied by the pedagogy	Teacher Competence	Generic Learning Activities	Roles	Context	Operations (Teaching - sequenced)	Functionality Requirement for Tools		
							Teaching Activities	Learning Activities	Assessment Activities
6	Construction	*Teacher expert in:* Encouraging and modeling reflection	Reflect critically (self-evaluation, self-analysis, re-iteration, planning)	Learner directed Teacher feedback Teacher defined tasks	One-to-one; Tutorial activity; Socially situated tasks	1.Agree learning outcomes; 2. Agree activity or task; 3. Capture initial learning; 4. Capture 'reflection'; 5. Assess performance against outcomes; 6. Provide formative feedback 7. Summarise feedback;	1,2,6,7 Communication (Synchronous) 3,4,5,7. Evaluation and Assessment	Evaluation & Assessment	Formative – assess for reflection (records kept)
7	Construction	*Teacher expert in:* Providing feedback on learners' value formation; judgments and interpretations	Evaluate Facts/concepts	Learner directed Teacher feedback Teacher defined tasks	One-to-many; Individual activity; Experiential tasks	1. Agree learning outcomes; 2. Define Scope/define activity or task (what, how much, how long etc); 3. Agree key references/resources to be evaluated; 4. Define Assessment method 5. Define key learning evaluation criteria; 6. Explain feedback process; 7.Check understanding of requirements; 8. Assess outputs against learning outcomes; 9. Provide feedback 10. Collect and summarise feedback for individual.	1,3. Communication (Synchronous) 2. Personal Management, Presentation and Dissemination 4,5. Presentation and Dissemination 6,7,9. Commmunication 6,7. Evaluation and Assessment, Communication 10. Data Analysis, Communication	Presentation & Dissemination Data analysis, Text & Data Manipulation	Summative assessment – essays, presentations and multiple choice. Formative assessment - progress against outcomes (records kept)

Pedagogic Perspective & Approach	Practitioner Approach implied by the pedagogy	Teacher Competence	Generic Learning Activities	Roles	Context	Operations (Teaching - sequenced)	Functionality Requirement for Tools		
							Teaching Activities	Learning Activities	Assessment Activities
8	Construction	*Teacher expert in:* Providing effective scaffolding.	Build/test theories	Learner directed Teacher feedback Teacher defined tasks	One-to-one; Individual activity; Concrete tasks	1. Agree learning outcomes; 2. Define appropriate task; 3.Explain feedback process; 4. Define evaluation criteria 5. Capture performance; 6. Assess outputs against learning outcomes; 7. provide feedback to individual; 8. summarise feedback for individual.	1. Communication (Synchronous) 2. Personal Management, Presentation and Dissemination 3,7. Communication 4. Presentation and Dissemination 5,6. Evaluation and Assessment 8. Data Analysis, Communication	Simulation, Communication,	Summative assessment – test results from simulations; report on methods etc Formative assessment – records of actual performance (key strokes, videos etc)
9	Construction	*Teacher expert in:* Presentation tools; mapping tools to content, and presentation techniques.	Present *(or explain?)* facts (Organise material; create meaningful/logical sequences; determine appropriate level of complexity (material to match audience); practice delivery, explain *(or present?)* facts/concepts)	Learner directed Teacher feedback Teacher defined tasks	One-to-many Individual activity Abstract task	1. Agree learning outcomes; 2. Define scope of presentation 3. Agree presentation method, place and time 4. Check presenter's references, resources etc 5. Check learner can use presentation tool (and train, if required) 6. Define success criteria for evaluation. 7. Listen to presentation 8. . Assess outputs against learning outcomes; 9. Provide feedback against success criteria; 10. collect and summarise feedback for individual.	1,3. Communication (Synchronous) 4,5,7,8 Evaluation & Assessment 2,6. Presentation and Dissemination 9. Communication 10. Data Analysis, Communication	Communication, Presentation & Dissemination,	Summative assessment - presentations
10	Construction	*Teacher expert in:* Creating an	Engage in discussion (Defend a position;	Learner directed Teacher	One-to-many Group activity;	1.Agree learning outcomes (purpose); 2. choose topic(s)	1,2,3,4,5,7. Communication (Synchronous)	Communication, Visualisation and Brainstorming	Summative assessment – observation

Pedagogic Perspective & Approach	Practitioner Approach implied by the pedagogy	Teacher Competence	Generic Learning Activities	Roles	Context	Operations (Teaching - sequenced)	Functionality Requirement for Tools		
							Teaching Activities	Learning Activities	Assessment Activities
		environment for knowledge sharing and nurturing of learning relationships	Setting up teams of learners; establishment of different roles in a team; Discussion; Sharing ideas and coming up with a combined list)	feedback Learner defined tasks	Concrete or abstract tasks	3. agree 'rules of engagement' 4. agree teacher (e.g. moderator) and student roles; 5. agree groups; set day, length and time for exchange); 6. Define evaluation criteria; 7. moderate exchange; 8. capture key learning events; 9. Assess outputs against learning outcomes; 10. collect and summarise feedback for group.	6. Presentation and Dissemination 8,9. Evaluation and Assessment 10. Data Analysis, Communication		
11	Social Construction	*Teacher expert in:* Providing effective scaffolding, organizing groups; collating feedback.	Build/test theories (generate hypothesis/question; select methods; devise experiment; choose resources; test theory; analyse results; revise test; retest; reflect; draw conclusions)	Learner directed Learner feedback Teacher defined tasks	one-to-many; Group activity; Concrete tasks	1. Agree learning outcomes; 2. Define appropriate task; 3.Agree feedback process; 4. Agree evaluation criteria 5. Agree group membership 6. Agree roles 7. Check progress 8. Monitor feedback; 9. . Assess outputs against learning outcomes; 10. Collect and summarise feedback for group.	1,3,4,5,6. Communication (Synchronous) 2. Personal Management, Presentation and Dissemination 7,8,9. Evaluation and Assessment, Communication 10. Data Analysis, Communication	Simulation, Communication (Synchronous)	Summative assessment – test results from simulations; report on methods etc Formative assessment – records of actual performance (key strokes, videos etc)

Pedagogic Perspective & Approach	Practitioner Approach implied by the pedagogy	Teacher Competence	Generic Learning Activities	Roles	Context	Operations (Teaching - sequenced)	Functionality Requirement for Tools		
							Teaching Activities	Learning Activities	Assessment Activities
12	Social Construction	*Teacher expert in:* Managing interactions in groups.	Engage in discussion	Learner directed Learner feedback Teacher defined tasks	Many-to-many; Group activity; Concrete tasks	1.Agree learning outcomes (purpose); 2. Choose topic(s) 3. Agree 'rules of engagement' 4. define teacher (e.g. moderator) and student roles; 5. create groups; set day, length and time for exchange); 6. Agree evaluation criteria; 7. moderate exchange; 8. capture key learning events; 9. . Assess outputs against learning outcomes; 10. collect and summarise feedback for group.	1,2, 3,6,7 Communication (Synchronous) 4. Presentation and Dissemination 5. Personal Management 8,9. Evaluation and Assessment 10. Data Analysis, Communication	Communication	Summative assessment – observation Formative assessment – inspection of plans etc.
13	Problem based	*Teacher expert in:* Problem domain; group dynamics	Solve problems	Learner directed Teacher feedback Teacher defined tasks	Many-to-many Group activity Real world tasks	1. Agree learning outcomes 2. Agree selection of real world tasks 3. define problem domain/space 4. Agree user instructions 5. Define assessment method 6 .Explain feedback process; 7. Define evaluation criteria 8. Agree group membership 9. Agree roles 10. check understanding of requirements 11. Check progress 12. Assess outputs against	1,2,4,8,9. Communication (Synchronous) 5,7. Presentation and Dissemination 6. Presentation and Dissemination, Communication 10,11,12. Evaluation and Assessment, Communication 13, 3. Communication 14. Data Analysis, Communication	Communication	Summative assessment - observation Formative assessment – inspection of plans etc.

Pedagogic Perspective & Approach	Practitioner Approach implied by the pedagogy	Teacher Competence	Generic Learning Activities	Roles	Context	Operations (Teaching - sequenced)	Functionality Requirement for Tools		
							Teaching Activities	Learning Activities	Assessment Activities
						learning outcomes; 13. Provide feedback 14. Collect and summarise feedback for group.			
Situationist perspective (Learning as developing social practice) 14	Situated Learning	*Teacher as expert in*: facilitating learner-directed task activities	Gather Facts/concepts (Gather resources; brainstorming a concept; discover facts; interpret facts; classify facts)	Learner directed Learner feedback Learner defined tasks	Many-to-many Group activity Real world tasks	1. Agree learning outcomes; 2. Agree scope of activity or task (what, how much, how long etc); 3. Agree key references/resources/tools; 4. Agree assessment method; 5. Check understanding of requirements; 6. Agree evaluation criteria 7. agree group membership 8. Agree roles 9. Check progress 10. Monitor feedback; 11. Assess outputs against learning outcomes; 12. Collect and summarise feedback for group.	1,2,3,4,6,7,8. Communication (Synchronous) 5,9,10,11. Evaluation and Assessment, 12. Communication Data Analysis, Communication	Visualisation and Brainstorming, Storing and Managing Information, Communication	Formative assessment – progress on achieving outcomes (records kept)

Pedagogic Perspective & Approach	Practitioner Approach implied by the pedagogy	Teacher Competence	Generic Learning Activities	Roles	Context	Operations (Teaching - sequenced)	Functionality Requirement for Tools		
							Teaching Activities	Learning Activities	Assessment Activities
15	Situated Learning	*Teacher expert in:* Creating an environment for knowledge sharing and nurturing of learning relationships	Engage in discussion (Defend a position; Setting up teams of learners; establishment of different roles in a team; Discussion; Sharing ideas and coming up with a combined list)	Learner directed Learner feedback Learner defined tasks	Many-to-many Group activity; Real world tasks	1.Agree learning outcomes (purpose); 2. Agree topic(s) 3. Agree 'rules of engagement' 4. Agree teacher (eg moderator) and student roles; 5. agree groups; set day, length and time for exchange); 6. agree evaluation criteria; 7. moderate exchange; 8. capture key learning events; 9. Assess outputs against learning outcomes; 10. collect and summarise feedback for group.	1,2,3,4,5,6,7. Communication (Synchronous) 8,9. Evaluation and Assessment 10. Data Analysis, Communication	Communication	Summative assessment – observation Formative assessment – inspection of plans etc.
16	Apprenticeship	*Teacher expert in:* Observation; critical reflection, people management	Applying & Acquiring Knowledge and skills to perform in real world settings	Teacher directed Teacher feedback Teacher defined tasks	One-to-one; Individual activity; Real world tasks (work based)	1.Define learning outcomes 2. Define key learning activities 3. Define ' rules of engagement' 4. Define Assessment Method 5. Define feedback process and schedule 6. Capture performance 7. assess outputs against learning outcomes; 8. provide feedback to individual; 9. summarize feedback for individual. 10. Define new key learning activities (back to activity 2)	1,2,3,4,5,10 Presentation and Dissemination 6,7. Evaluation and Assessment 8. Communication 9. Data Analysis, Communication	Communication	Summative assessment – observation Formative assessment – inspection of plans etc.

6. General Descriptions and Mini-scenarios on each Row in the Mapping Table

The mini-scenarios and row descriptions were created for three purposes: firstly they provided a way of checking the validity and consistency of each row by attempting to apply a 'real' example. Secondly they provide a common language for describing the content of each row. And thirdly they could act as a specification for the case study projects.

Each row has one high level description and some are illustrated with examples from either HE or FE. ACL was not described as the team lack sufficient depth of expertise as well as time to create useful examples.

Row 1: Instruction: Hierarchical Skill Acquisition

General Description: In this approach a skill is broken down into a series of task competencies or skill-levels, and each of these is specified as a learning outcome. These will typically be identified, and the levels specified, through a detailed task analysis. Each skill or task component will be practised by the learner until a criterion performance level is attained. Ideally this practice will take place in a learning environment where immediate and detailed feedback is given, allowing the learner to reach the criterion as efficiently as possible. The programme will then usually involve further stages by which the components are integrated, by practising the overall skill in larger chunks, until the overall fully-integrated performance is reached.

HE Mini Scenario: Training in clinical skills has become a central theme in many reformed curricula in medical Schools. Many graduates were qualifying in medicine with inadequate development of clinical skills and as a result, feeling unprepared for the work they were about to undertake as junior hospital doctors. The Caledonian Medical School is a newly-established medical School in the UK. In response to the need for a new approach to clinical skills training the School's new curriculum committee has elected to create a programme that will begin from day one of the undergraduate career and which will continue throughout the entire five years of the undergraduate course. The main purpose of the clinical skills training is to provide opportunities for students to use these skills in a protected environment that will enable them to develop their integration of these skills into their developing professional practice. The learning environment is designed to use virtual reality and simulation, employing both hi-fidelity manikins and realistic computer-based virtual scenarios that allow the development and testing of skills.

The clinical skills training will be delivered in a purpose built Clinical Skills Resource Centre. Each student is required to reach criterion performance in a simulation before submitting to a personal performance and tutor feedback on a particular skill. Each simulation involves immediate detailed feedback on performance as well as an indication of overall level. The component skills are: history taking and interviewing,

general physical examination, vital signs, HEENT, cardiovascular, pulmonary, abdominal, breast, musculoskeletal, neurological, dermatological, ECG interpretation, lumbar puncture. On reaching criterion in the entire series the student moves to the integrative phase with manikins, and finally with role play patients, in each case being given immediate feedback from an observing tutor. Focus in this final phase is on the seamless integration of the component skills. Final assessment avoids the fragmentation of competency assessment associated with the OSCE. This assessment involves the use of real patients, assessment of integrated consultation skills, is fully observed by pairs of examiners, and is assessed against explicit validated competency criteria.

Row 2: Co-Instruction: Gathering facts

General Description: This approach is a variation on the conventional 'teacher as instructor' case, where the teacher attempts to present subject matter in a form that is optimal for the students' learning. The emphasis is still on representation of the subject matter, and explanation, however, because a constructive approach has been adopted, the learners 'direct' their learning. This is normally a process of negotiation where the teacher will determine through discussion what the learners know and don't know and on this basis agree what new concepts or facts are required to progress more effectively. The most important variable, therefore, is in the prior stage of uncovering the learners' current framework of understanding, and then matching the representation to that requirement. Far more important than the medium of presentation of subject matter is the task carried out by the learner which leads them to engage with the material in the first place. This more 'cognitive' approach is what distinguishes this row from the traditional 'instructivist', 'transmission' or delivery model of learning.

Mini Scenario from FE: John is a teacher in Car Mechanics and he is preparing his first 1 hour lesson of the year on the theory of the internal combustion engine for a level X NVQ. The students are apprentices in garages and are on day release. This is an orientation presentation designed to give the students some general background information on the principles (and some history) of the internal combustion engine. The learners will be expected to write a short paper on the principles as part of their mid-term assessment. Before preparing the presentation, John sends by email a short questionnaire to each learner and their work place supervisor. The questionnaire is designed to uncover their current level of knowledge and expertise. This allows John to more tightly tailor his talk to the needs of his students. John then uses MS PowerPoint to plan his lecture by creating a contents slide first. This includes the objectives of the presentation as well as the main principles to be covered, ending with how and when they will be assessed. He then creates a slide for each part with bullet points for the main areas to be covered. John also has access to a video clip of Diesel discussing his new engine and how it differs from the traditional petrol engine, and a clip from Ford discussing the history of the automotive industry. He decides to use the Ford clip first as a way capturing their attention as well as giving a broader historical context. He then presents the general principle using a mixture of bullet points illustrated by diagrams, and later by working (simulated) models. All of this used PowerPoint as a framework to hyperlink into objects like diagrams and video clips. He ended with the Diesel clip, and

with 10 mins left asked the class whether the diesel engine is still an example of an internal combustion engine and to draw out from the similarities and differences, the generic principles of the internal combustion engine. As they spoke, John noted their contributions on an electronic whiteboard and promised to summarise it and email it to them all within the next two days.

Row 3: Co-Instruction: Learner Provided Feedback

General Description: This approach to learning is a variation on Row 2. The major difference is that the learner rather than the teacher in this case provides feedback on performance. Learner feedback is a form of 'teach-back' to the tutor. The learning outcomes will be expressed in terms of the exploration of a subject, the location of boundaries (and thus some understanding of its relation to similar areas), and the ability to gain sufficient understanding of the subject matter to be able to explain its main principles or content to someone else. The tutor will typically provide guidance on sources. Thus, an area of knowledge or expertise will be agreed between the teacher and learner, together with starter references or urls, and a description of the form in which an exposition of this topic should be prepared.

Mini scenario for HE: It is the second term of the year, and Bill is preparing his first lecture on 'e-learning technologies'. Bill had asked five selected students at the end of last term to prepare a short presentation using PowerPoint on what they though were the main outcomes of last term's lectures. The class started with these presentations, and Bill used them to reinforce key learning points using an electronic whiteboard as well as introducing new concepts to be addressed in this term's programme.

Row 4: Co-instruction: Work based Learning

General Description: The course contents and control resides with the teacher and their academic institution, but the learner is learning at work. The work place provides a context for the studying, and learning points can be abstracted from experience, but equally where experience is lacking and competency is missing then further study will be required. To be successful this approach requires close collaboration with a mentor in the work place and hence why it is 'co-instruction'. The mentor is responsible for the day-to-day operations, facilitating learning and assessment, but are not necessarily experts in specific knowledge domains, nor will they have control over the curriculum and its general execution (though they may well influence future curriculum design and execution). Success of such teaching is very dependent on the relationship between the teacher, the mentor and the learner.

Row 5: Construction: Learner Controlled Assignments.

General Description: In this approach students are asked to undertake a task involving the exploration of subject matter: a high level description of what is required is agreed with the tutor, but the exact approach to be taken and the resources to be used are decisions for the learners. The tutor will respond to questions, and offer advice on

sources and methods when this advice is sought, and will provide formative feedback when this is asked for, and on submission of a draft. Thus the learners are invited to make use of the tutor's expertise as one resource among many possible.

Mini-scenario for HE: Karen is a module-leader for a third year Scottish Literature course. Karen has designed one of the module assignments to achieve the learning outcome of gaining understanding of the way in which literary form and style varies with the writer's perception of the readership. She decides to ask the students to submit a book review in two forms, demonstrating how the review itself would differ according to the assumed profile of the readership for each review. To provide guidance on the nature of what is being asked for, Karen provides some examples, using real reviews that are online. These examples are discussed with the learners and they are invited to choose the most appropriate one for their assignment. Karen asks the students to submit their individual plans by email prior to commencing writing, including offering some examples of how the form and style would change with the choices of review publication, and how these choices would differ for different genres: there is a firm deadline for this submission, and Karen undertakes to provide feedback individually to each student within three days of this deadline. As part of the feedback Karen invites each student to consult her further on specific choices of author and nature of publication, but makes it clear that she will not offer suggestions for the choices themselves. Before the assignment commences it occurs to Karen that the individual submissions and her comments on them will be a valuable resource in themselves. It also occurs to her that the assessment she will carry out on each individual submission involves her in making exactly the kind of judgments that demonstrate the learning outcomes.

Row 6: Construction: Critical Reflection

General Description: This is a key approach which can be combined with many others: the important learning outcome is that the learner should engage in *reflection*. John Cowan in 'On Becoming an Innovative University Teacher' has written an entire book[8] devoted to this issue and he provides many examples. Reflection is most readily achieved where learners have responsibility for the learning tasks but where tutors may intervene to prompt reflection-in-action (or reflection-on-action, or –for-action) and will provide formative assessments in a form that encourages further reflection about the extent to which learning outcomes are being achieved. This approach focuses on the explicit encouragement of reflection, but it should be noted that all constructivist approaches should involve reflection at some level.

Mini-scenarios for FE: Detailed examples of technology-enhanced reflection are given in Chapter 3 of John Cowan's book (examples are given in maths, economics and classics).

[8] J. Cowan. On becoming an Innovative University Teacher. Open University Press: Milton Keynes, 1998

Row 7: Construction: Evaluation of other peoples' concepts, performances and opinions

General Description: This describes a situation where the learner is invited to evaluate, review or judge some one else's performance, concepts and/or opinions, usually found in readings or other resources (eg videos). Although the teacher will agree the outcomes with the learner (eg what constitutes the 'value' criteria'), the remaining activity is traditionally quite teacher-centric. The teacher will normally provide the materials to be evaluated, and feed back and assessment is usually summative (eg through commenting on and marking essays).

Mini-Scenario for FE: Jill is teaching Hairdressing to second year NVQ students. As part of the mid-term assignment she wanted to expose learners to a series of videos showing famous hairdressers in action and get them to judge the technical and stylistic quality of the hairdressers being videoed. She asks all the learners to write down and email her the criteria they will use to make their judgments. She comments on these and emails back her response. The learners were each given a copy of the video and a video editing tool. They were then expected to produce an assignment that evaluated the hairdresser performance against the criteria, and illustrating the point being made by relevant clips from the video. These were emailed to the tutor who marked and commented on each one.

Row 8: Construction: Scaffolding

General Description: Here the example involves a learner in developing their understanding, through the performance of tasks which involve the learner in constructing some kind of explanation – a model, theory or argument. The learning environment should support this process through *scaffolding*. The aim of technology-based scaffolding is to provide some of the same kinds of support a teacher could provide in a classroom setting, but now in a computer-based learning environment. Scaffolding involves providing some kind of support that helps the learner make progress, particularly with their level of understanding, while at the same time maximizing the learner's ability to perform the task independently. Applications of scaffolding can vary according to who regulates the scaffolding (teacher, peer-student, computer, self), technology used, or according to its intended learning outcome. Often the scaffolding will provide examples, cues, or parts of a solution, at key moments. It may provide a model for design, or a structure to design in. It may also involve coaching comments, intended for motivation, providing feedback and advice on performance, and provoking reflection.

Mini-scenarios: Examples can be drawn from almost any area of HE teaching. It is most obviously seen in the teaching of science or engineering principles, where interactive simulations can offer prompts (eg Multiverse) and cues.

Row 9: Construction: Learner Presentations

General description: This is similar to the 'teach-back' in row 3 but here the focus is explicitly on the learners' ability to explain their ideas, and present their conclusions, to a particular audience. The learning outcomes here are focused on the ability to explain both principles and detail to someone else. There is a rather subtle distinction between this and 'teach-back'. Here the emphasis is on explanation, whereas the emphasis in teach-back is on understanding. In both cases the tutor will typically provide guidance on sources, and will have set the parameters of the task. Here, though, the learner will be entirely responsible for the way in which his or her material is structured and presented, whereas in teach-back the tutor may be actively probing the student's level of understanding.

Typically, this method will involve a student explaining their work to their peers, usually in some kind of presentation (this could, of course, be on-line). The tutor will give general guidance on presentation methods, and detailed feedback to each individual. The formative nature of this will focus on improving communication skills generically, as well as involving comment on the relation between the content and the form in which the learner chose to present it. With the introduction of PDP in HE, all subject areas are being required to consider how they support students' generic communication skills. The student presentation to the class is becoming ubiquitous.

Row 10: Construction: Discussion

General Description: This approach involves the achievement of learning outcomes through peer discussion. It assumes that defining the tasks is itself part of that discussion, and learners should feel complete ownership of the learning activity. Many choices are offered by the use of discussion as a pedagogical tool. Indeed, several key issues for networked learning are raised: the role of the e-moderator, the affordances of the discussion tools, the influence of the assessment, the nature of the tasks and the structure of the groups.

In general, the tutor's role will be to try to encourage discussion which enhances the learning benefits for all learners. A challenge for the tutor is to judge when to contribute to the discussion, and how actively to try to moderate discussion so as to more directly focus on the achievement of the learning outcomes. There is also the question of how to ensure that everyone contributes without at the same time losing the quality of spontaneity that is characteristic of good learning discussions. Peer discussion had, of course, been a feature of small group tutorials long before online environments allowed discussion to occur asynchronously.

Discussion can be combined with all other teaching methods – it is perfectly feasible, for example, to include opportunities for discussion with an ISD approach to skill integration. However, it is necessary to be explicit about the intended learning outcomes from discussion. Although peer discussion offers a method for the deepening of understanding of the subject matter under discussion, the most enduring benefits are

likely to come through the forming of learning relationships and the creation of a group culture of shared knowledge building.

The learning benefits of discussion are not obtained solely by the active participants. Online discussion can be stored and made available for other learners: the 're-use' of discussion (by selecting those discussions which have led to real learning gains and indexing them in some way) is one of the methods by which vicarious learning can be facilitated through technology.

Row 11: Social Construction: Group Work

General Description: This case involves groups of learners working together to achieve task goals that have been specified by an assignment or group project. Here, what is emphasised is the understanding the group achieves by working together. The learning outcomes will be expressed in terms of the depth of understanding reached of the subject matter, or the quality of solution of a problem, or the creativity of a design or other output. The tutor may be involved as a group facilitator, but typically there will also be an element of informal peer tutoring. If the group is required to produce a single output, such as a report of a group project, then learners within the group will exchange feedback on each others' contributions. This may extend to methods of formal peer assessment.

Row 12: Social Construction: Interactions in groups.

General Description: In this case the focus is on the management of the interactions within groups, and the achievement of the meta-cognitive learning outcomes of learning to work collaboratively and cooperatively. The learning outcomes will be expressed in these terms, rather than on understanding of the subject matter, or success of the group tasks per se. Intended learning outcomes will also include the formation of learning relationships and will be expressed in terms of establishing a group ethos that can be regarded as an emerging community of practice. The tutor will be required to set the group tasks in such a way as to encourage maximum group interaction, while at the same time handing over control of the learning process *per se* to the groups themselves.

Row 13: Problem-based or Resource-based Learning

General Description: This is the now familiar paradigm of problem-based learning, in which an individual learner, or more typically a small group, is presented with a problem and is provided with a range of resources which the learners are free to use in order to arrive at a solution. The tutor's role will be facilitative, and then becomes critical at the feedback stage. In fact the extent to which learning outcomes are achieved will often depend on the quality of the feedback given after a solution has been delivered. This approach provides many opportunities for e-learning tools (such as case-based reasoning environments eg PATSy) and VLEs. There are case studies of this approach on the LTSN subject centre web-sites for GEES (Geography, Earth and Environmental Sciences) and Medicine, Dentistry and Veterinary Medicine.

This approach is gaining popularity as a way of approaching the teaching of an entire curriculum.

Row 14: Situated Learning: Gathering facts/concepts

General Description: An activity where learners draw upon their resources (knowledge, experience etc) and through social interaction share and refine their understanding of a particular concept, act or judgement. Although the very nature of this activity requires some 'engagement in discussion', the primary emphasis is on discovery and sharing through social engagement rather than gathering facts and concepts through more traditional routes of reading, listening and watching of predefined sources.

Row 15: Situated Learning: Engaging in Discussion

General description: The learner engages in debate and discussion but does so by drawing upon their personal or life experiences (ie the learning is *situated* in those experiences). These experiences provide the learner with a body of knowledge to draw upon, and help the teacher delineate what the learners know, misunderstand and/or does not know. The activity is usually accompanied by learners reflecting on and feeding back comments on each others' performance. The interactive nature of the activity also allows learners to develop or refine their position through dialogue and discourse. The role of the teacher is key to creating and supporting a constructive environment where discussion can be stimulating but not threatening.

Row 16: Apprenticeship: Learning from real world settings

General Description: This case describes one of the typical situations found in work-based learning, where an individual learner (the apprentice) learns directly from an expert or mentor (the master). It depends heavily on the 'master' having sufficient insights into their own knowledge base to expose the learners to real world situations that fulfil a given learning outcome. Equally successful teaching requires points of reflection where the teacher can 'rehearse' certain learning situations and assess what the learner actually learnt. It is a mistake to think of the teacher's (ie master) or learners (ie apprentice) roles as being entirely passive. Observation is critical, but it is followed by reflection, and appropriate and timely feedback. Using technology to capture and edit the 'learning experiences' is an important part of the learning process.

Mini-scenario from HE: Clare is a consultant in a teaching hospital. Each year she is allocated two final year students to 'shadow' her doing her every day work. Each morning she sends each student an email outlining her schedule for the day, and what activities she believes that they should pay particular attention to. During the day she will often pause and make a comment to the students about her reasoning behind a diagnosis or treatment decision. However, the Teaching Hospital has, for training purposes high quality video recording equipment in all the main Theatres and Wards, so

at the end of the day she can review and edit some of the highlights to email the clips to the students, who are invited to comment on what they think is taking place and why.

7. Going from the generic to the specific: the Case Studies

The Mapping Table was designed to derive a set of generic functionality for e-learning technology, and as such is relatively maintenance free. The mapping of the generic to the specific is much more complex, and is partially dependent on an up-to-date and complete list of all e-learning technologies. It is also highly dependent on the specific practitioner's context, including such information as learner's levels of competence, subject matter, organisational context, type of qualification and so on and so forth.

One possible method of achieving the mapping from generic to specific is to create a set of contextual questions that would bridge between the Mapping Table and the multitude of case studies that already exist or are being collected. Such a mapping would require a common and standard classification scheme for describing the case studies. This 'meta-data' would map to the contextual questions and thus allow access to appropriately matched case materials (see Stage3 Demonstrator (Version 1) for how this might work in practice).

There are implications with adopting this approach. First that such classification scheme would have to be created and implemented. Secondly, it assumes that all rows in the table will have access to multiple case studies (at least one HE, FE, ACL case). To help address the first two points the project team has been working closely (and will continue to do so) with the Case Studies projects to help define such a classification scheme, and identifying missing case material. And thirdly, that the rows themselves are meaningful or valid with respect to the existing case material. The latter point is very much a case of alignment between the rows and the case material, and the question of granularity becomes critical.

The question of alignment was partially addressed in the validation of the mapping table carried out by the JISC funded Case Studies in e-learning practice Project (see Ravenscroft et al[9]). Unfortunately due to timing issues the validation occurred on an earlier version of the table, and significant changes have been made to the table whilst the validation exercise was in progress. However, a number of important lessons were still learnt:

- The problem with rows providing a self contained description. There were a number of occasions when the validators felt that they wanted to 'cross' or combine different elements from different rows. A **state transition diagram** may therefore be a more appropriate representation. However, it must be restated that rows represent **ideals** of effective practice derived from theory –

[9] Ravenscroft, A., Boyle, T., Cook, J., & Clay, J. (2004) Initial Interim Report for JISC Case Studies in e-learning practice to sipport the e-learning and pedagogy programme. JISC Internal Report.

some case material may not show effective practice, though they do show actual practice.

- The mappings seemed more brittle at the **theory side** of the table. This may well be a question of justification (seeStage 2 Learning Models (Version 1)) and making those justifications transparent to practitioners (see the explanation boxes in the planning tool - Stage 3 Demonstrator (Version 1) Equally, the use of other tables to explain the rationale of the overall mapping table was thought to be useful, and some such tables have been included in this document.
- The table per se is difficult to use and an explicit **methodology** is required. This document hopefully provides some of the methodology driving the use of the table and certainly the 'planning tool' should make the use of the tables clearer.
- The question of **granularity** was also raised. Some of the problem lies in the lack of explanatory text which this document hopefully provides. However, some of the case material does exist at different levels and could be excluded. The rows are at the 'learning activity' level. However, there is no reason for not using case material to illustrate 'spot' cases (ie a particular box within the matrix, for example, a case study explaining the constructionist approach to learning). Indeed such an example (video) is provided in the Planning Tool (see Stage3 Demonstrator (Version 1)).
- **Terminology** was also noted as a problem. To overcome this issue a specific 'glossary' has been produced for the Planning Tool to define the terms actually used in the table (and tool). Further, the general descriptions and mini-scenarios were thought to be useful in grounding the terms in appropriate educational context.
- The validators were also concerned that there was an inherent **HE bias.** However, the ACL case (Case Study 4) was deemed to have a reasonable fit, though concerns were raised with respect to the FE Case (Case study 3). It is also hoped that the FE mini-scenarios will help alleviate some of these concerns. Finally, the teaching sequences should be revisited to check their relevance to equivalent FE and ACL activities.

Although the original Case validations were undertaken on an earlier version of the table, it was possible to amend one to fit with the latest version of the table (see below). This particular one was chosen because, *prima facia*, it should the best fit, at least in terms of granularity. The results suggest that the goodness-of-fit was high, but other examples are needed to fully check the internal validity of the table.

Pedagogic Perspective & Approach	Practitioner Approach implied by the pedagogy	Teacher Competence	Generic Learning Activities	Roles	Context	Teaching Activities (sequenced)	Functionality Requirement for Tools		
							Teaching Activities	Learning Activities	Assessment Activities
Cognitive	Social Construction	*Teacher expert in:* Managing interactions in groups.	Engage in discussion	Learner directed Learner feedback Teacher defined tasks	Many-to-many; Group activity; Concrete tasks	1.Agree learning outcomes (purpose); 2. Choose topic(s) 3. Agree 'rules of engagement' 4. define teacher (e.g. moderator) and student roles; 5. create groups; set day, length and time for exchange); 6. Agree evaluation criteria; 7. moderate exchange; 8. capture key learning events; 9. . Assess outputs against learning outcomes; 10. collect and summarise feedback for group.	1,2, 3,6,7 Communication (Synchronous) 4. Presentation and Dissemination 5. Personal Management 8,9. Evaluation and Assessment 10. Data Analysis, Communication	Communication	Summative assessment – observation Formative assessment – inspection of plans etc.
The Case Study (CS) has clear theoretical foundations, derived from neo-Vygotskian social constructivism/ dialogical learning. So theoretical mapping here is accurate	CS represents a social constructionist approach, aimed at social and cognitive development	Activities are managed and set up by a facilitator – who may be a student or a teacher	Discussion in the CS is quite organised and structured, i.e. argumentation specified as a dialogue-game in the context of a broader, also defined, learning activity model (Johnson & Johnson, 1993)	The CS activity is learner directed, i.e. peer-learning but managed by a facilitator	The CS is a Small group activity, clearly defined as 4 – 8 participants	The CS involves managing argumentation exercises through integrating with curriculum. Setting up exercises, setting times for synchronous discussion, monitoring exercises and noting outcomes (e.g. summary of debates). So CS is a reasonable realisation of this cell	Monitoring and managing dialogue exercises	Communication and critical discussion through collaborative argumentation	Informal Tutor assessment of dialogues for good group argumentation and individual academic skills. Informal students assessment of individual and collaborative performance

8. Conclusions and Recommendations

The Mapping exercise remains essentially a conceptual one and therefore is unvalidated. However, the small validation exercise that was carried out was promising. Clearly more work is required in matching case material to validate the rows. This will require close inter-working with the Case Study teams, and as a by-product, will help those teams more closely identify gaps and define their case material.

> **Recommendation 1**: A formal validation exercise preferably between members of the Desk Study Team (estimated 10 mandays of effort) and Case Study team (estimated 20 mandays of effort) is supported.
>
> **Recommendation 2**: Funding is found to continue the external validation exercise with the JISC experts (estimated 10 mandays)

The mapping onto specific tools requires a classification scheme to define the necessary metadata to aid selection. At the very least such an activity would help standardise the selection and description of the case material. The output from such an exercise would feed in well with the current standards bodies' efforts, particularly the IMS Learning Design specification.

> **Recommendation 3:** Funding (estimated 12 mandays) is found to continue to support Desk Study team working with the Case study teams on selection and standards for case materials.
>
> **Recommendation 4:** Funding is required (estimated 10 mandays plus T & S) to liaise with key standard making bodies.

Stage 1 of the desk study proved to be overambitious and overlapped significantly with many of the stage 2 activities (notable the review of the theoretical work). There is a need to undertake a more 'bottom-up' exercise by reviewing and analysing existing practice, particularly that captured by case material. The outputs from such an exercise would strengthen both the Case Studies projects and provide further validation for the Mapping Table.

> **Recommendation 5**: Funding is required (estimated 50 mandays) to undertake a detailed review and analysis of existing case material to provide a description of the frequency and application of different pedagogical approaches, and their implications for effective practice.

Finally, it is recognised that the timescales of the Desk Study were short and sharp, and new conceptualisations continue to appear. The Mapping Table needs to continuously develop throughout the programme. This

development would integrate new conceptualisations [10] and allow the table to reflect the results from other projects in JISC's e-learning and related programmes. This may require some 'ad hoc' funding arrangement according to the state -of-the-art.

[10] For example: Conole, G., & Fill, K. (in prep). Specification for Learning Activities Design toolkit.